REMARKS

Pending in the application are claims 1-21, of which claims 1, 20 and 21 are independent. The following comments address all stated grounds for rejection and place the presently pending claims, as identified above, in condition for allowance

Rejections Pursuant to 35 U.S.C. §112

The Examiner has rejected claim 7 as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Applicants submit amended claim 7 to address this rejection, wherein the objectionable terminology has been deleted. Applicants submit that this amendment to claim 7 introduces no new matter and is fully supported by the specification as filed.

Rejections Pursuant to 35 U.S.C. §102(b)

The Examines rejected claims 1-6, 13-15 and 18-21 pursuant to 35 U.S.C. §102, as being unpatentable over U.S. Patent No. 6,240,370 (hereinafter "Sonneland"). Applicants respectfully traverse this rejection in view of currently amended independent claims 1, 20 and 21. Applicants further submit that said claim amendments are fully supported by the originally filed specification and introduce no new matter.

The present invention, as disclosed in currently amended independent claim 1, recites the identification of a plurality of extrema positions associated with seismic data, followed by the derivation of coefficients that characterize the seismic data waveform in the vicinity of the extrema positions *from a single data point*. Groups of extrema positions are then formed where the derived coefficients are similar. Independent claims 20 and 21 further recite a computer system and computer program in keeping with the means recited in presently amended claim 1.

The cited reference, which shares an inventor with the current application, solely recites the processing of seismic signals which are reflected by a particular subsurface feature by decomposing the reflected signals with respect to a series of polynomial coefficients which characterize the reflectivity of the subsurface feature. The use of this technique is noted in the

present application, at page 6 line 5, as a suitable means by which extrema positions may be derived. Applicants respectfully submit that this technique is solely an illustrative embodiment capable of identifying a plurality of extrema positions in accordance with the present invention and is not the only applicable means for identifying extrema positions.

Applicants further submit that the cited art to Sonneland fails to recite or disclose each element of the presently pending application. For example, as recite din claim 1, the *derivation of coefficients that characterize the seismic data waveform from a single data point, in the vicinity of the extrema positions* is neither recited nor disclosed by the Sonneland art. In contrast, Sonneland recites the explicit observation of *polynomial coefficients* to detect geological conditions. Applicants further submit that Sonneland fails to recite or disclose the forming of groups of extrema positions with similar derived coefficients in accordance with the present invention.

Applicants further submit that dependent claims 2-6, 13-15 and 18-19, which depend on claim 1 for support, are in condition for allowance by their very nature as dependent claims which further limit independent claim 1. Applicants additionally submit that the elements recited in these independent claims are neither recited nor disclosed by the Sonneland reference. For example, Applicants submit that the formation of extrema group positions using either supervised classification or unsupervised classification, as recited in claims 8 and 10 respectively, is not recited by the cited reference.

In view of the above, Applicants respectfully submit that the Sonneland reference fails to anticipate claims 1-6, 13-15 and 18-21 of the present invention. Applicants therefore request that the Examiner withdraw the aforementioned rejection and pass claims 1-6, 13-15 and 18-21, as presently presented, to allowance.

Rejections Pursuant to 35 U.S.C. §103(a)

The Examiner rejected claims 8-12 pursuant to 35 U.S.C. §103 as being unpatentable over Sonneland in view of U.S. Patent No. 5,615,171 (hereinafter "Hildenbrand") The Examiner has further rejected claims 16-17 under 35 U.S.C. §103 in view of Sonneland and further in view

of U.S. Patent Application No. US2003/0023383 A1 (hereinafter "Stark"). For the reasons set forth below, Applicants respectfully traverse these rejections.

Summary of Hildebrand

Hildebrand recites a method for seismic data interpretation by selection of 3 dimensional seismic data for use in subsurface geology and geometry analysis. Individual seismic events or horizons are tracked or picked through 3-dimensional volumes of data in accordance with the Hildebrand reference. Additionally, each descendent picked point is associated with a parent seed point such that each original point is associated with each further selected point. The association of points is stored in a computer based memory. Furthermore, a hierarchical presentation of each point, as well as the preceding and following point may be displayed such that a graphical representation of a starting seed point though a selected picked point may be displayed.

Argument

Applicants respectfully submit that dependent claims 8-12, which rely on independent claim 1 for support, are not rendered obvious by the cited art to Sonneland in view of Hildebrand as the cited reference fail to teach each element of the Applicant's invention. Presently amended claim 1 of the current application recites the identification of a plurality of extrema positions associated with seismic data, the derivation of coefficients that characterize the seismic data from a single data point in the vicinity of the extrema positions and the forming of groups of extrema positions where the coefficients are similar. Claims 8-12 serve to further narrow this dependent claim. For example, claims 8 and 10 introduce the element of formation of groups of extrema positions using supervised or unsupervised classification. As noted by the Examiner in the present Office Action, these classification techniques are not disclosed by Sonneland.

The Examiner suggests that supervised and unsupervised classification, in accordance with the present invention, is taught by the Hildebrand reference. Applicants respectfully disagree. As recited in the present invention, the formation of groups of extrema positions using supervised or unsupervised classification methods results in the formation of groups in which the coefficients that characterize the seismic data waveform in the vicinity of the extrema positions

are similar. These coefficients, in accordance with independent claim 1, are derived coefficients from a single data point that characterize the seismic data waveform in the vicinity of the extrema positions.

Applicants submit that the formation of groups of extrema positions based upon derived coefficients, using the various classification techniques recited herein, is neither taught nor suggested by Hildebrand. IN contrast, the Hildebrand reference solely recites iterative picking of a "seed point" by a user based on information such as maximum or minimum amplitude. Hildebrand fails to teach or suggest formation of groups where the derived coefficients are similar using the various classifications techniques recite din the present application. In view of this, Applicants respectfully submit that presently pending claims 8-12 are not rendered obvious in view of the Sonneland and Hildebrand references. Applicants therefore respectfully request that the Examiner pass claims 8-12 to allowance as drafted.

Summary of Stark

The Stark patent application reference recites a system for analyzing seismic data which includes the generation of a derived data volume based on a selected geologic time volume of a subsurface region of interest. In accordance with the Stark reference, the derived data volume may include various volumes such as discontinuity volumes or fault volumes.

Argument

In view of the Examiners rejection of claims 16 and 17 in view of Sonneland and further in view of Stark, Applicants respectfully submit that claims 16 and 17 are not rendered obvious by the cited references as the cited references fail to teach or suggest each element of the presently pending claims. Applicants submit that dependent claims 16, which relies on claim 15 for support, recites the determination of fault displacement estimates using extracted horizon estimates wherein these horizon segments are extracted on opposite side of input fault surfaces. As recited at paragraph 008 of the present invention, automatic extraction and pairing of horizons on opposite sides of a fault allows for the calculation of displacement as the offset of these horizons in their intersections with the fault plane. Calculations such as these can be preformed automatically resulting in automatic fault displacement assessments which vary spatially along the fault plane. Claim 17 of the presently pending application, which relies on

claim 16 for support, further recites that fault displacement estimates are decomposed into vertical throw and horizontal heave components.

Applicants submit that the combination of Sonneland, in view of Stark, fails to teach or suggest that which is claimed in presently pending claims 16 and 17. As set forth prior, Applicants submit that the cited reference Sonneland reference fails to teach or suggest each element of claim 1, on which dependent claims 16 and 17 rely indirectly. For example, it is Applicants contention that Sonneland fails to teach or suggest the derivation of coefficients that characterize the seismic data *from a single data point* in the vicinity of the extrema positions. Applicants further submit that the Stark reference additionally fails to teach or suggest such an element. In view of this, Applicants submit that the underlying dependent claim, on which claims 16 and 17 rely, is in condition for allowance in view of the cited art. In view of this, Applicants believe that claims 16 and 17 are not rendered obvious and are in condition for allowance.

Conclusion

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account N°. 19-0615, under Order No. 60.1531 from which the undersigned is authorized to draw.

Dated: December 12,2005

Respectfully submitted,

By _____

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